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Abstract

PURPOSE: To sharply reduce a lattice defect density at the upper part of a selective epitaxial growth layer by a method wherein a thin film is grown in such a way that a ratio of a height to a width of a groove satisfies a specific condition.

CONSTITUTION: SiO₂ 12 with a film thickness of (h) is grown on a (100) Si substrate 11 by thermal oxidation; then, a square window part where a <110> direction is used as one side of a length (w) is formed in an SiO₂ mask material by a dry etching operation. Then, the substrate is installed in a low-pressure MOCVD apparatus so as to obtain $h > w \tan \theta$; the surface of Si exposed on the bottom of the window part is cleaned in AsH₃ which has been diluted by H₂; then, GaAs 13 is grown selectively in the window part in an atomic-layer growth mode by using diethyl gallium chloride (DEGaA) and AsH₃ as raw materials.